



Overview of DoD chromate usage and database

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Cr⁶⁺ usage in DoD

Cr⁶⁺ (CrVI, hexavalent chrome, chromate) is our primary corrosion

Cr⁶⁺-containing coatings

- Chromate conversion coatings
- Chromate sealers
- Chromated primers
- Chromate washes
- Chromated metallic-ceramics

Cr⁶⁺ processes, non-Cr⁶⁺ coatings

- Hard chrome plating
- Chromic acid anodizing
- Chromic acid passivation

Cr⁶⁺-containing coatings are a problem for sustainment (repaint, touch-up, corrosion control)



Cr⁶⁺-free coatings



Material	Status of alternatives
Chromate conversion coating	Trivalent chrome and non-Cr commercially available. Not yet as good as Cr ⁶⁺ . Used on cars, Boeing 777, various military systems, USAF T.O. 1-1-8 Prekote;
Chromate primers	Non-Cr primers commercially available. Used on F-35, AH-64 Apache. Performance good on Cr ⁶⁺ conversion coating. Moving toward total non-Cr ⁶⁺
Chromate finish system	Low temperature powder coat and UV curable finishes in validation to replace primer/topcoat for aircraft and vehicles.
Chromate conversion of Mg	Tagnite now used on EFV gearbox, some sumps, gearboxes for AH-64, CH-53. Performance much better than Cr ⁶⁺ conversion and anodize. DoD use still very
Metallic-ceramics	Low-Cr and non-Cr available commercially. Performance uncertain
Chromate washes	Direct-to-metal used for MRAP. Poor performance

Cr⁶⁺-free processes now in use

Material	Status
Hard chrome plating	HVOF on F-35 landing gear, all new commercial and military landing gear. Being implemented for
Chromic acid anodize	TFSAA approved by NAVAIR, BSAA by Boeing





ASETSDEFENSE SOURCES OF INFORMATION



ASETSDefense

<http://www.asetdefense.org>



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ASETSDefense

Advanced Surface Engineering Technologies for a ASETSDefense - is a Department of Defense (DoD) Strategic Environmental Research and Development Environmental Security Technology Certification Program facilitate the implementation of new, environment engineering (coatings and surface treatments) by background information and technical data from review evaluation efforts as well as the status of approval ASETSDefense provides defense organizations with improve weapons system performance and life-cycle environmental safety and occupational health (ESH) treatment processes that utilize hexavalent chromate, chromic acid); coatings that contain volatile organic compounds (VOC).

Surface Engineering Database

Together with SERDP and ESTCP, ASETSDefense is designed with a search capability to provide access needed to make informed decisions on the use of technologies for surface engineering that pose environmental risks. The information includes detailed engineering data, background information on processes and products that have been implemented. For more information and to access

Alternatives Quick Links

- Cadmium Plating
- Chromate Conversion
- Chromate Metallic-Ceramics
- Chromate Primers
- Chromate Sealants
- Chromic Acid Anodize
- Hard Chromium Plating
- High VOC Materials

Quick information on alternatives

ASETSDefense workshop agendas, briefings, summaries (HCAT meetings coming soon)

Database

Team Work Spaces

Tools to be added

Quick Links basic information

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Chromate Conversion Alternatives

Current Usage

Chromate conversion coatings and chromated sealers are used to create a self-healing conversion coating on Al and Mg alloys that is resistant to corrosion. They are also used for sealing electroplated and anodized coatings. These treatments are typically used prior to painting and finishing, since they generally improve adhesion of paints and sealants.



Typical Applications	Typical Chromate Conversion Coatings	Specifications
<ul style="list-style-type: none"> • Aircraft skins • Al frames for aircraft and vehicles • Mg gearboxes • Corrosion-resistant coatings (Cd, Al, ZnNi, etc.) • Anodize sealing • Fasteners and electrical connectors (Zn or Cd plated) • Wash primer for steels, armor 	<ul style="list-style-type: none"> • Conversion and sealing coatings for Al (e.g., Alodine, Iridite, etc.) • Conversion and sealing coatings for Mg (e.g., Dow 7, 17, 19, HAE anodize) 	<ul style="list-style-type: none"> • MIL-DTL-81706 • MIL-C-5541 • MIL-M-45202 • AMS 3171 • TO 1-1-8 • MIL-A-8625 • MIL-C-3171 • MIL-C-17711 • MIL-M-45202 • DOD-P-15328 • QQ-P-416

ESOH Issues

Cr⁶⁺ (CrVI, hexavalent chromium) is a known carcinogen that is strongly regulated under

- EPA Clean Air Act rules
- OSHA Occupational Exposure to Hexavalent Chromium (Cr⁶⁺ PEL is currently 5µgm⁻³)
- European rules (RoHS, WEEE, ELV)

Exposure

Personnel may be exposed during manufacture, depot overhaul, repaint, and operational level touch-up and repair.



DATABASE

Database – Simple search

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Detail Search: Click Search button to activate. Choose options in search boxes and click Search button.

Alternative To:

Document Category:

Generic Systems:

Applications:

Designed to answer question "What alternative to hard chrome (etc) is available (authorized, implemented, spec'd) for my type of system and application?"



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Systems

corrosion

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All Coatings

All Tests

Technical Report, Do

Chromate Aluminum

Phase 1 Report

NoFilter

Contains

Solid rocket booster

Conversion: Hexavalent Cr

F-16

Conversion: Trivalent Cr - not TCP

LCAC

Conversion: Non-chrome

S-3

PreKote

F-18

Conversion: Adhesion promoter

C-46

Alodine 5200/5700

AAAV

AC-130/131 (Boegel)

Akclimate

Chemidize 727ND

Oxylan AL-500

Sanchem 7000

Alodine 1200S

TCP (NAVAIR)

02GN089 (Rare earth primer)
02GN098
02Y40
03GY321
03GY369 A/B
05510WEP/05511CEH-X
10PW22-2
16708TEP/16709CEH
17176KEP/16709CEH
44GN007
44GN008A
55W002/82X001
65Y003
99GY001 APC
AC-130/131 (Boegel)
Akclimate
Al-ceramic (chrome free)
Alodine 1200S
Alodine 5200/5700
Alodine 5900
AlumiPlate
Anodizing: Tagnite
Cd electroplate
Chemidize 727ND
Conversion: Adhesion promoter
Conversion: Hexavalent Cr
Conversion: Non-chrome
Conversion: TCP-license (Trivalent Chro)

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Search for specific materials,
systems, tests, people,
organizations



From: Commander, Naval
To: Distribution

Subj: NAVAL AIR SYST
CHROMATED PAI

Ref: (a) CNASC Ltr: 131
Implementation
(b) Materials Engine
of MIL-PRF-23;
Coatings, Inc."
(c) Materials Engine
of MIL-PRF-23;
Coatings
(d) Materi
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Environmental Security Tech
(EST)
Joint Group on Polluti

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Hard Chrome Altern



Fatigue and images HVOF on Actuator materials.xls

